Patent claims

1. A current/voltage converter arrangement, in particular for a switched-mode power supply,

- having a current/voltage input region (E), which has first and second input terminals (E1, E2), for taking up a primary AC current (Iprim) or primary current (Iprim) and/or a primary AC voltage (Uprim) or primary voltage (Uprim), in particular with an input frequency (vin),
- having a current/voltage output region (A) for providing and/or outputting a secondary current (Isec) and/or a secondary voltage (Usec), and
- having an intervening transformer device (T) for current/voltage conversion with a primary side (TP), which has a primary inductance (L1) with a first and a second input terminal (TE1, TE2), and with a secondary side (TS), which has a secondary inductance (L2, L3) coupled inductively and to the primary inductance (L1),

wherein,

- a first switch device (T1) with a first - in particular essentially unidirectional - bypass function (TD1) is provided between the first input terminal (TE1) of the primary side (TP) of the transformer device (T) and the first input terminal (E1) of the current/voltage input region (E),
- a second switch device (T2) with a second - in particular essentially unidirectional - bypass function (TD2) is provided between the second input terminal (TE2) of the primary side (TD) of the transformer device (T) and the second input terminal (E2) of the current/voltage input region (E),
- the first bypass function (TD1) and the second bypass function (TD2) are respectively in parallel with a first switch mechanism (TM1) of the first switch device (T1) and in parallel with a second switch mechanism (TM2) of the second switch device (T2) and formed and/or arranged in such a way that the respective switch mechanism (TM1, TM2) of the re-

spective switch device (T1, T2) can be bypassed in each case in a controllable manner with an electrical conduction path,

- the first switch device (T1) and the second switch device (T2) are formed in antiseries with respect to one another, and
- the first switch device (T1) and the second switch device (T2) can be switched on and/or off in a controlled manner, in a manner dependent on the primary potential (Uprim) and/or on the primary current (Iprim), in a clocked manner with a comparatively high or higher switching frequency (vsw) with respect to the input frequency (vin), and in an alternative manner with respect to one another.

2. The current/voltage converter arrangement as claimed in claim 1,
wherein,
the first switch mechanism (TM1) and the first bypass function (TD1) of the first switch device (T1) are respectively formed in antiseries with respect to the second switch mechanism (TM2) and with respect to the second bypass function (TD2) of the second switch device (T2).

3. The current/voltage converter arrangement as claimed in one of the preceding claims,
wherein,
the first switch mechanism (TM1) and/or the second switch mechanism (TM2) are formed as a bipolar transistor or an IGBT.

4. The current/voltage converter arrangement as claimed in claim 3,
wherein,
the first bypass function (TD1) and/or the second bypass function (TD2) are provided and formed as explicit diode devices.

5. The current/voltage converter arrangement as claimed in one of the preceding claims,
wherein,
the first switch mechanism (TM1) and/or the second switch mechanism (TM2) are formed as a MOSFET.

6. The current/voltage converter arrangement as claimed in one of the preceding claims,
wherein,
the first bypass function (TD1) and/or the second bypass function (TD2) are formed as a parasitic diode device and in particular as a parasitic body diode (BD1, BD2).

7. The current/voltage converter arrangement as claimed in one of the preceding claims,
wherein,
the first switch device (T1) and the second switch device (T2) can be connected or are connected directly to the primary voltage (Uprim).

8. The current/voltage converter arrangement as claimed in one of the preceding claims,
wherein,
the first switch device (T1) and the second switch device (T2) in interaction form a synchronous rectifier or can be operated or are operated as such.

9. The current/voltage converter arrangement as claimed in one of the preceding claims,
wherein,
the first bypass function (TD1) and the second bypass function (TD2) are formed and/or arranged in such a way that in interaction they can be operated or are operated as a primary-side rectifier device.

10. The current/voltage converter arrangement as claimed in one of the preceding claims, wherein, the transformer device (T) is constructed and arranged and can be operated and/or is operated essentially in accordance with the flyback converter principle.

11. The current/voltage converter arrangement as claimed in one of the preceding claims, wherein , the secondary inductance (L2, L3) is formed by an individual inductance (L2) or by a first secondary inductance (L2) and a second secondary inductance (L3).

12. The current/voltage converter arrangement as claimed in one of the preceding claims, wherein, a secondary-side rectifier device (G2) is provided between the secondary inductance (L2, L3) and the current/voltage output region (A).

13. The current/voltage converter arrangement as claimed in claim 12, wherein, the secondary-side rectifier device (G2) is formed as an arrangement of diode devices (D1, D2, D3, D4).

14. The current/voltage converter arrangement as claimed in either of claims 12 and 13, wherein, the secondary-side rectifier device (G2) is formed as a rectifier half-bridge with two diode devices (D1, D2), particularly if the secondary inductance (L2, L3) is formed as an individual inductance (L2).

15. The current/voltage converter arrangement as claimed in either of claims 12 and 13,
wherein,
the secondary-side rectifier device (G2) is formed as a rectifier full bridge with four diode devices (D1, D2, D3, D4), particularly if the secondary inductance (L2, L3) is formed by a first secondary inductance (L2) and by a second secondary inductance (L3).

16. The current/voltage converter arrangement as claimed in one of claims 12 to 15,
wherein,
the diode devices (D1, D2, D3, D4) of the secondary-side rectifier device (G2) are formed by MOSFETs.

17. The current/voltage converter arrangement as claimed in claim 16,
wherein,
the secondary-side rectifier device (G2) can be operated or is operated in the synchronous rectifier mode.

18. The current/voltage converter arrangement as claimed in one of the preceding claims,
wherein,
a capacitor device (C1) for smoothing and/or for energy storage is provided between the current output region (A) and the secondary-side rectifier device (G2) in parallel with first and with second output terminals (A1, A2) of the output terminal region (A).

19. The current/voltage converter arrangement as claimed in claim 18,
wherein,
- a serial isolating device (T3) is provided between the capacitor device (C1) and the secondary-side rectifier device (G2), and

- the serial isolating device (T3) is formed to prevent and/or to suppress, in a controlled manner in a manner that is potential-dependent and/or phase-dependent on the primary current (Iprim) and/or on the primary voltage (Uprim), a direct application of the primary voltage (Uprim) to the capacitor device (C1), in particular when or as long as the primary current (Iprim) flows in the primary inductance (L1).

20. The current/voltage converter arrangement as claimed in claim 19,
wherein
the serial isolating device (T3) has a switch device (T3) or is formed as such.

21. The current/voltage converter arrangement as claimed in either of claims 19 and 20,
wherein,
the serial isolating device (T3) has a MOSFET or is formed as such.

22. The current/voltage converter arrangement as claimed in one of claims 19 to 21,
wherein,
the serial isolating device (T3) is inversely clocked and/or inversely controlled or inversely clockable and/or inversely controllable with respect to the first and/or with respect to the second switch device (T1, T2).